

Sub 1  
1. A coated article comprising:  
2 a temperature-sensitive substrate having a melting point lower than glass;  
3 an anti-reflection coating including a plurality of layers substantially transparent to visible  
4 light, at least one of said layers being a [DC] reactively sputtered material having a refractive index  
5 higher than said substrate and selected from the group consisting of tin oxide, indium oxide, zinc  
6 oxide, tin-doped indium oxide, antimony-doped tin oxide, tin-bismuth oxide, and tin-zinc oxide, and  
7 at least one other layer having a refractive index lower than said substrate.

1 2. The article of claim 1 wherein said substrate is plastic.

2 3. The article of claim 1 wherein said other layer is ~~substantially~~ silicon dioxide.

3 4. The article of claim 3 wherein said [DC] reactively sputtered material is tin oxide.

4 5. The article of claim 3 wherein said [DC] reactively sputtered material is tin-doped indium  
oxide.

5 6. The article of claim 1 wherein said [DC] reactively sputtered material has a refractive index  
between 1.9 and 2.2.

6 7. The article of claim 1 wherein said plurality of layers includes four layers designated the  
first, second, third, and fourth layers in consecutive numerical order beginning with the layer farthest  
from the substrate,

8 said first layer having a refractive index lower than said substrate and having an optical  
thickness of about one-quarter wavelength at a wavelength between 480 and 560 nanometers,

9 said second layer having a refractive index higher than said substrate and having an optical  
thickness between about one-quarter and one-third of a wavelength at a wavelength between 480  
and 560 nanometers,

10 said third layer having a refractive index lower than said second layer,

said fourth layer having a refractive index greater than said third layer,

11 said third and fourth layers having a total optical thickness less than one-quarter wavelength  
12 at a wavelength between 480 and 560 nanometers, and  
13 at least one of said second and fourth layers being said selected sputtered material.

1 8. A process for making a coated article, comprising the steps of:  
2 providing a temperature-sensitive surface having a melting point lower than glass; and  
3 disposing an anti-reflection coating including a plurality of layers substantially transparent  
4 to visible light on said surface, said disposing step including the steps of [DC] reactively sputtering  
5 a material selected from the group consisting of tin oxide, indium oxide, zinc oxide, tin-doped  
6 indium oxide, antimony-doped tin oxide, tin-bismuth oxide, and tin-zinc oxide, and  
7 depositing at least one other layer having a refractive index different from said [DC]  
8 reactively sputtered material.

1 9. An anti-reflection coating for a substrate, comprising:  
2 four layers substantially transparent to visible light and designated the first, second, third,  
3 and fourth layers in consecutive numerical order beginning with the layer farthest from the substrate;  
4 said first layer substantially composed of silicon dioxide having a refractive index lower than  
5 said substrate, and optical thickness of about one-quarter wavelength at a wavelength between 480  
6 and 560 nanometers, and a physical thickness of about 94.2 nanometers;  
7 said second layer substantially composed of [DC reactively sputtered] tin oxide having a  
8 refractive index higher than said substrate, an optical thickness between about one-quarter and one-  
9 third of a wavelength at a wavelength between 480 and 560 nanometers, and a physical thickness  
10 of about 76.4 nanometers;  
11 said third layer substantially composed of silicon dioxide having a refractive index lower  
12 than said second layer and a physical thickness of about 31.9 nanometers;  
13 said fourth layer substantially composed of [DC reactively sputtered] tin oxide having a  
14 refractive index greater than said third layer and a physical thickness of about 20.3 nanometers; and  
15 said third and fourth layers having a total optical thickness less than one-quarter wavelength  
16 at a wavelength between 480 and 560 nanometers.

1 10. An anti-reflection coating for a substrate, comprising:  
2 four layers substantially transparent to visible light and designated the first, second, third,  
3 and fourth layers in consecutive numerical order beginning with the layer farthest from the substrate;  
4 said first layer ~~substantially~~ composed of silicon dioxide having a refractive index lower than  
5 said substrate, an optical thickness of about one-quarter wavelength at a wavelength between 480  
6 and 560 nanometers, and a physical thickness of about 92.2 nanometers;  
7 said second layer ~~substantially~~ composed of [DC reactively sputtered] tin oxide having a  
8 refractive index higher than said substrate, an optical thickness between about one-quarter and one-  
9 third of a wavelength at a wavelength between 480 and 560 nanometers, and a physical thickness  
10 of about 78.1 nanometers;  
11 said third layer ~~substantially~~ composed of silicon dioxide having a refractive index lower  
12 than said second layer and a physical thickness of about 32.2 nanometers;  
13 said fourth layer ~~substantially~~ composed of [DC reactively sputtered] tin oxide having a  
14 refractive index greater than said third layer and a physical thickness of about 18.6 nanometers; and  
15 said third and fourth layers having a total optical thickness less than one-quarter wavelength  
16 at a wavelength between 480 and 560 nanometers.

17 11. The article of claim 1 wherein said sputtered material is a DC reactively sputtered material.

18 12. The article of claim 1 wherein said substrate is plastic.

19 13. The article of claim 1 wherein said other layer is ~~substantially~~ silicon dioxide.

20 14. The article of claim 13 wherein said DC reactively sputtered material is tin oxide.

21 15. The article of claim 13 wherein said DC reactively sputtered material is tin-doped indium  
22 oxide.

23 16. The article of claim 11 wherein said DC reactively sputtered material has a refractive index  
24 between 1.9 and 2.2.

Sub 11  
17. The article of claim 11 wherein said plurality of layers includes four layers designated the first, second, third, and fourth layers in consecutive numerical order beginning with the layer farthest from the substrate.

4 said first layer having a refractive index lower than said substrate and having an optical  
5 thickness of about one-quarter wavelength at a wavelength between 480 and 560 nanometers.

6 said second layer having a refractive index higher than said substrate and having an optical  
7 thickness between about one-quarter and one-third of a wavelength at a wavelength between 480  
8 and 560 nanometers.

9 said third layer having a refractive index lower than said second layer.

10 said fourth layer having a refractive index greater than said third layer.

11 said third and fourth layers having a total optical thickness less than one-quarter wavelength  
12 at a wavelength between 480 and 560 nanometers, and

13 at least one of said second and fourth layers being said selected sputtered material.

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15 18. The process of claim 8 wherein the step of sputtering is DC reactively sputtering.

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17 19. The coating of claim 9 wherein the tin oxide of said second layer is reactively sputtered and  
18 the tin oxide of said fourth layer is reactively sputtered.

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20 20. The coating of claim 19 wherein said tin oxide of said second layer is DC reactively  
21 sputtered and said tin oxide of said fourth layer is DC reactively sputtered.

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23 21. The coating of claim 10 wherein the tin oxide of said second layer is reactively sputtered and  
24 the tin oxide of said fourth layer is reactively sputtered.

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26 22. The coating of claim 21 wherein the tin oxide of said second layer is DC reactively sputtered  
27 and the tin oxide of said fourth layer is DC reactively sputtered.

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29 23. The article of claim 22 wherein said sputtered material is reactively sputtered.

1 24. The article of claim 2 wherein said sputtered material is reactively sputtered.

1 25. The article of claim 3 wherein said sputtered material is reactively sputtered.

1 26. The article of claim 4 wherein said sputtered material is reactively sputtered.

1 27. The article of claim 5 wherein said sputtered material is reactively sputtered.

1 28. The article of claim 6 wherein said sputtered material is reactively sputtered.

1 29. The article of claim 7 wherein said sputtered material is reactively sputtered.

1 30. The article of claim 8 wherein said sputtered material is reactively sputtered.

1 21 31. The coating of claim 9 wherein the tin oxide of said second layer is sputtered and the tin oxide of said fourth layer is sputtered.

1 25 32. The coating of claim 10 wherein the tin oxide of said second layer is sputtered and the tin oxide of said fourth layer is sputtered.

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